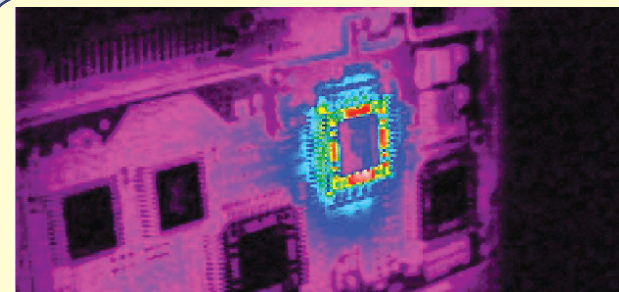


Instrument Capabilities

- ▶ **FAILURE SITE LOCATION TECHNIQUES.** Infrared thermography, photon emission microscopy, liquid crystals. Electron beam induced current. Voltage contrast in the SEM used to detect opens and shorts.
- ▶ **OPTICAL MICROSCOPY.** High resolution digital outputs are available from a range of low to high magnification microscopes.
- ▶ **PRECISION MICROSECTIONING.** Quantitative control of material removed during polishing.
- ▶ **SCANNING ELECTRON MICROSCOPY/ENERGY DISPERSIVE X-RAY ANALYSIS.** Variable pressure, field emission SEM with EDX, with high resolution at low accelerating voltages, provides excellent images of non-conducting samples.
- ▶ **INFRARED ANALYSIS OF THERMAL PROPERTIES OF COMPONENTS.** Infrared camera and microscope provide non-destructive temperature distribution across components and small systems in ambient, controlled environment and vacuum conditions.
- ▶ **ATOMIC FORCE MICROSCOPY.** Contact and tapping mode AFM.
- ▶ **CATHODOLUMINESCENCE, PHOTOLUMINECENCE, ELECTROLUMINESCENCE.** The emission of photons upon electron beam, photon, or electric field excitation, respectively, is used to characterize materials, especially semiconductors. Detectors are optimized for visible and infrared regions; sample temperature can be varied.

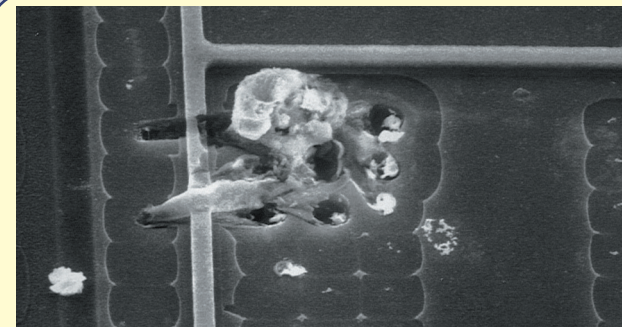


Lab Spotlight:



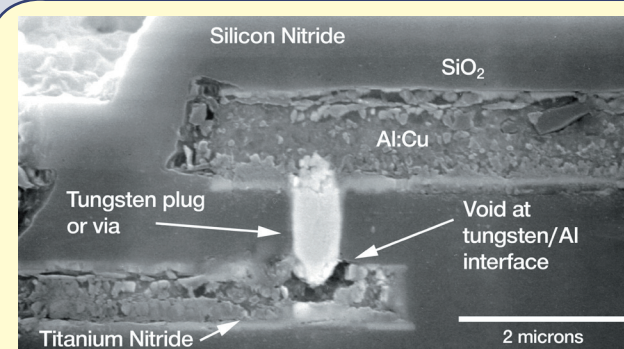
Identification of Failing Electrical Component on Board by Infrared Thermography

The component drawing excessive current was quickly identified by locating the over-heated component in the infrared image.



Electrostatic Discharge

The failure site on an integrated circuit is typical of the damage induced by electrostatic discharge.



Electromigration Failure Site in an Integrated Circuit

Precision micro-sectioning revealed that failure during a reliability test resulted from electromigration and formation of a void.

Test Capabilities

- ▶ **ELECTRICAL BENCH TESTING OF COMPONENTS AND DICE.** Verify component failure modes; screen electrical components.
- ▶ **FAILURE ANALYSIS OF DICE, COMPONENTS, PACKAGES, AND BOARDS.** Determination of root cause of electrical and mechanical failures through failure mode verification, location of failure site, materials analysis of failure site, and relation to process history.
- ▶ **DESTRUCTIVE PHYSICAL ANALYSIS AND PARTS CONSTRUCTION ANALYSIS OF ELECTRONIC COMPONENTS.** Structural analysis of electronic components to verify quality and conformance to specifications.
- ▶ **RELIABILITY TESTING OF ELECTRONIC AND OPTOELECTRONIC COMPONENTS.** Components can be tested in ambient conditions, at high and low temperatures, and in vacuum.
- ▶ **PROGRAMMING OF FPGAs AND PROMs.**
- ▶ **MIL STANDARD TESTS.** X-ray Radiography, PIND, Hermeticity, RGA, Bond Pull, Die Shear, Passive Component Shear, Ball Shear, Dye Penetrant Testing, Random Vibration Testing, Temperature/Humidity Testing (steady state).
- ▶ **TESTING OF COMPONENTS UNDER EXTREME TEMPERATURES.** Temperature chambers cover the range from 4 K to 700 K.